PATENT SPECIFICATION

708,502

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COMPLETE SPECIFICATION

Improvements relating to the manufacture of Footwear with Soles of Mouldable Material

We, SUPERGA SOCIETA PER AZIONI, a Body Corporate organised under the Laws of Italy, of Via Verolengo 28, Torino, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the manufacture of footwear in which the sole, composed of rubber, synthetic resin of a like mouldable material, is bonded to the upper while it is being formed, the upper, that has been previously attached to an insole and placed on the last, being held against the mould itself.

In the usual methods, the last carrying the upper is placed against the mould so that it rests on and presses against the inner edge of the side wall of the mould, the latter having the shape of the sole to be formed therein. The material for the sole, which is to be pressure bonded to the upper, is first placed in the mould cavity, thus filling it. The upper is then placed over the mould, thereby closing the mould cavity filled with the sole material. In practice, however, the mould cavity is never tightly closed all round the edge of the upper, with the result that there are inevitably points therealong where tightness is imperfect and where spewing of the material takes place with consequent formation of burrs along the edges of the sole which stick partly also to the upper. The operation of removing these burrs is long and costly, and cannot always be accomplished satisfactorily.

The object of the present invention is to provide an improvement upon the above procedure eliminating this trouble.

According to the present invention, a method of manufacturing footwear of the type in which the sole is composed of rubber, synthetic resin or a like mouldable material and is formed in situ on the upper by a moulding process in which it becomes simultaneously bonded to the upper and to an insole previously attached thereto, the unit comprising the upper and the insole being mounted on a last which during the moulding operation is placed over the mould so as to close the cavity thereof, and in which a strip overlying at least the upper face of the marginal portion of the sole is bonded thereto during the moulding process, is characterised in that said strip is fixed to the outside of the upper, along the marginal portions thereof where the upper joins the sole in the finished footwear, before the unit comprising the upper and the insole, in position on the last, is applied to the mould, the outer margin of the strip being held during the moulding operation tightly against the upper edge of the side wall of the mould while the rest of the strip extends into the mould cavity so as to intervene between the material therein and the underside of said marginal portions of the upper, with the result that during the formation of the sole the latter becomes securely bonded both to the underside of said unit comprising the upper and the insole and also to the underside of the strip, the latter serving during the moulding operation to seal the mould cavity against spewing of material therefrom and subsequently, in the finished footwear, to form a welt therein.

While the sole is being formed the last only need be held to prevent it from moving relatively to the mould due to the pressure existing therein. Such movement would cause dangerous stresses in the strip, the edge of which may be held in position during the moulding operation by, for instance, a small frame placed over it and pressing it firmly against the upper edge of the side wall of the mould.

When the moulding operation is finished, the strip will be found to be firmly attached to the sole, forming a welt as described above, and the superfluous outer marginal portion of the strip projecting from the edge of the sole can then be trimmed off. In some cases it can be folded down on to the

side of the sole, or it may even be turned under the edge of the sole and bonded to it by suitable means.

The method according to this invention can be used for making footwear with soles either in rubber or in synthetic resin, particularly a thermoplastic material. The rubber may be sponge rubber and the synthetic resin a sponge synthetic resin. In either of these cases the internal pressure which is generated in the rubber mix or, as the case may be, the thermoplastic or other synthetic resin, from the foaming agent which is introduced into the mould along with the rubber or synthetic resin forming material to cause the same to become spongy, is utilised to bond the sole to the unit comprising the upper and the insole previously attached, on the one hand, and the welt forming strip on the other.

A compact sole can also be formed with a rubber mix not containing a foaming agent, producing the necessary pressure in the mould by making one element thereof movable relatively to the rest of the mould so that it serves as a piston therein effective to compress the material.

The sole can also be formed by injecting a thermoplastic material into the mould, the latter in this case being provided with a hole or holes through which the material is injected. The roughness and porosity of the outside of the upper and the inside of the welt forming strip are sufficient to ensure a good penetration, and therefore a perfect and lasting adherence of the sole to these parts. If the adherence should tend to be insufficient, the surfaces to be united may be spread with an adhesive solution suited to the material of the sole.

The invention will now be further described with reference to the accompanying drawing, which illustrates two forms of the invention by way of example.

In the drawing, Fig. 1 is a transverse section, largely diagrammatic, through a shoe in course of manufacture by the method of the invention, in a case where the sole is made of thermoplastic material injected into the mould, and Fig. 2 is a similar section, in a case where the sole is made of a rubber mix bonded to the upper and welt by means of pressure exerted by a movable element of the mould acting as a piston.

Referring to Fig. 1, L indicates the last on which is placed an upper 1, previously attached to an insole 2 and also to a strip of flexible material 3 to form the welt. The strip 3 is wider than is necessary to form the welt, as its outer margin is to be sandwiched under pressure between the upper surface 4 of the side wall of the mould 5 and a small frame 6 held tightly against the mould to increase the pressure and to ensure the hermetical tightness of the mould cavity 8 while the sole is being formed and bonded to the rest of the shoe. A thermoplastic material such as polyvinyl chloride or vinylidene chloride is then injected by way of a hole 7 in the bottom of the mould, into the cavity 8 so as to fill it, thereby forming the sole, which as it is formed, becomes simultaneously bonded to the upper and welt by the injection pressure.

To reduce the volume, and therefore the weight, of the thermoplastic material used to form the sole, a filling of felt, regenerated cork or similar material 9 can be placed beneath the undersole prior to the placing of the last and the parts on it over the mould.

According to the form of the invention illustrated in Fig. 2, the mould 5 comprises at the base thereof a mobile part 10 acting as a piston, so that after the rubber mix has been introduced into the mould cavity, the bonding pressure is applied and the cavity of the last is filled completely by raising the piston to the extent necessary.

During the operation of forming the sole and bonding it to the upper and welt, the pressure of the frame 6 against the edge of the mould is maintained, to ensure perfect adhesion of the strip forming the welt, at the same time keeping the last firm so that it does not rise with respect to the mould. This is achieved by means of the device and procedure already described with reference to Fig. 1.

What we claim is:—

1. A method of manufacturing footwear of the type in which the sole is composed of rubber, synthetic resin or a like mouldable material and is formed in situ on the upper by a moulding process in which it becomes simultaneously bonded to the upper and to an insole previously attached thereto, the unit comprising the upper and the insole being mounted on a last which during the moulding operation is placed over the mould so as to close the cavity thereof, and in which a strip overlying at least the upper face of the marginal portion of the sole is bonded thereto during the moulding process, characterised in that said strip is fixed to the outside of the upper, along the marginal portions thereof where the upper joins the sole in the finished footwear, before the unit comprising the upper and the insole, in position on the last, is applied to the mould, the outer margin of the strip being held during the moulding operation tightly against the upper edge of the side wall of the mould while the rest of the strip extends into the mould cavity so as to intervene between the material therein and the underside of said marginal portions of the upper, with the result that during the formation of the sole the latter becomes securely bonded both to the underside of said unit comprising the upper and the insole and also to the underside of the strip, the strip serving during the moulding operation to seal the mould cavity against

spewing of material therefrom and subsequently, in the finished footwear, to form a welt therein.

2. A method as claimed in Claim 1, wherein the inner edge of the strip is inset from the edge of the upper so as to leave a portion thereof directly exposed to the material in the mould.

3. A method as claimed in Claim 1 or Claim 2, wherein subsequently to the moulding operation and to removal of the footwear from the mould, the outer marginal portion of the strip which during the moulding operation overlay the upper edge of the side wall of the mould is trimmed off at the edge of the sole.

4. A method as claimed in Claim 1 or Claim 2, wherein subsequently to the moulding operation and to removal of the footwear from the mould, the outer marginal portion of the strip which during the moulding operation overlay the upper edge of the side wall of the mould is folded on to the side of the sole, with or without also on to the adjacent portion of the underside thereof, and bonded thereto.

5. A method as claimed in any of the preceding claims, the sole being formed of thermoplastic material, e.g., a thermoplastic synthetic resin, wherein said material is injected into the mould under pressure.

6. A method as claimed in Claim 5, wherein the surfaces of the unit comprising the upper and the insole to be bonded to the sole during the formation thereof are coated with an adhesive material prior to the moulding operation to assist in the obtaining of a perfect bond.

7. A method as claimed in any of the Claims 1 to 4, the sole being formed from a sponge rubber forming mix containing a foaming agent.

8. A method as claimed in any of the Claims 1 to 4, the sole being formed from a rubber mix which during the moulding operation is compressed by a movable part of the mould acting as a piston therein.

9. A method of manufacturing footwear of the type referred to herein, substantially as hereinbefore described.

10. Footwear when produced by a method as claimed in any of the preceding claims.

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708,502 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

FIG. 1.

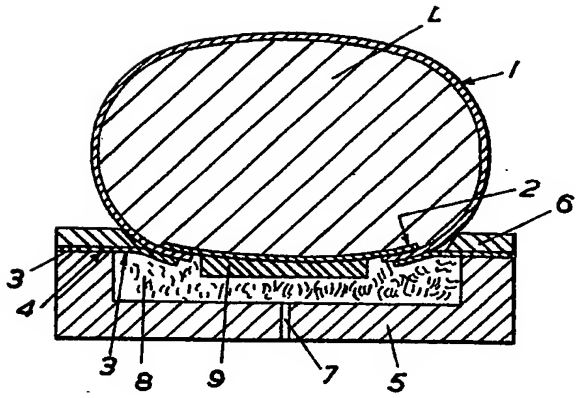

FIG. 2.